



Honeywell SWAN Radio Overview

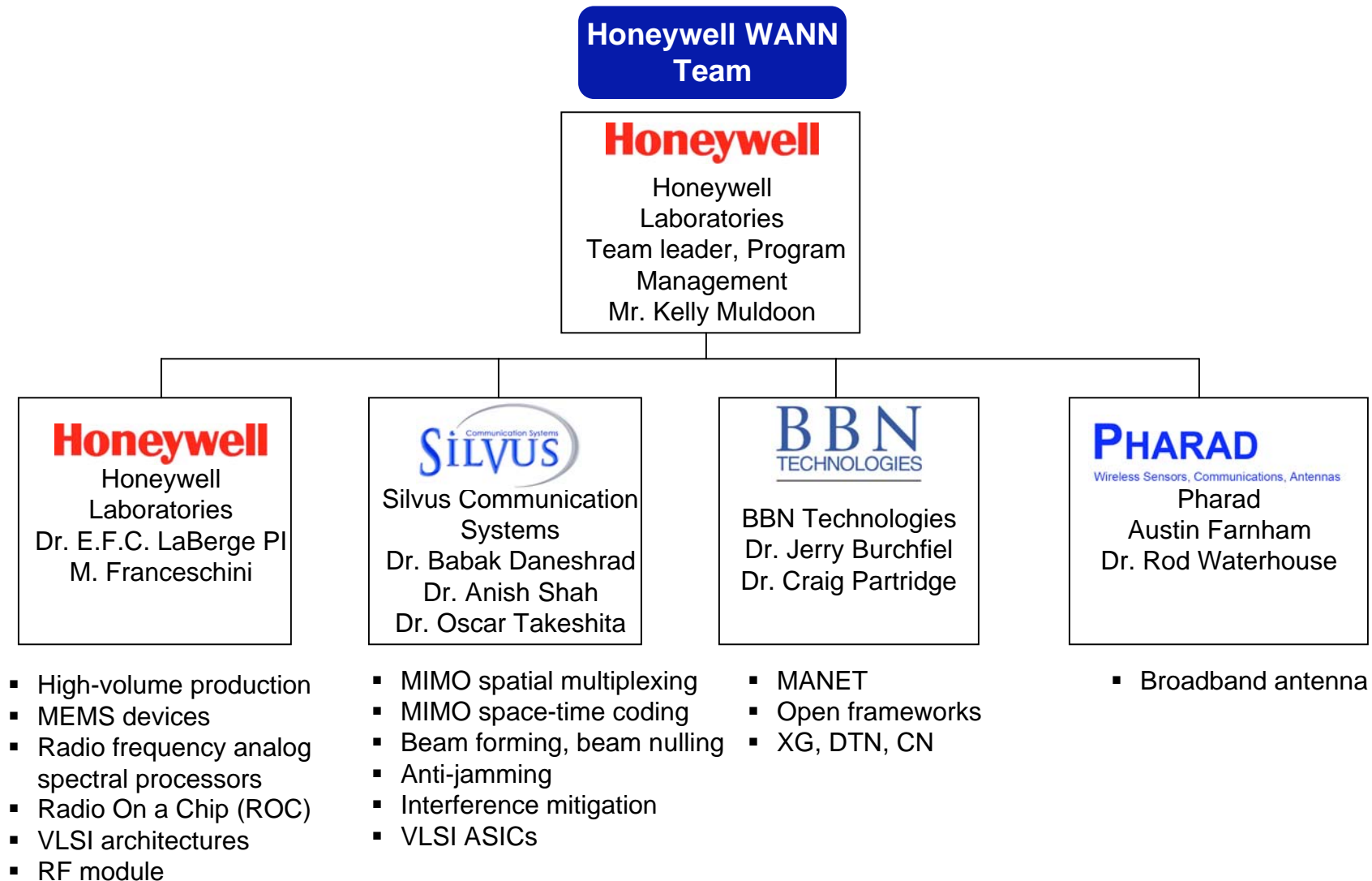
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Honeywell WANN Program Top Level Organization

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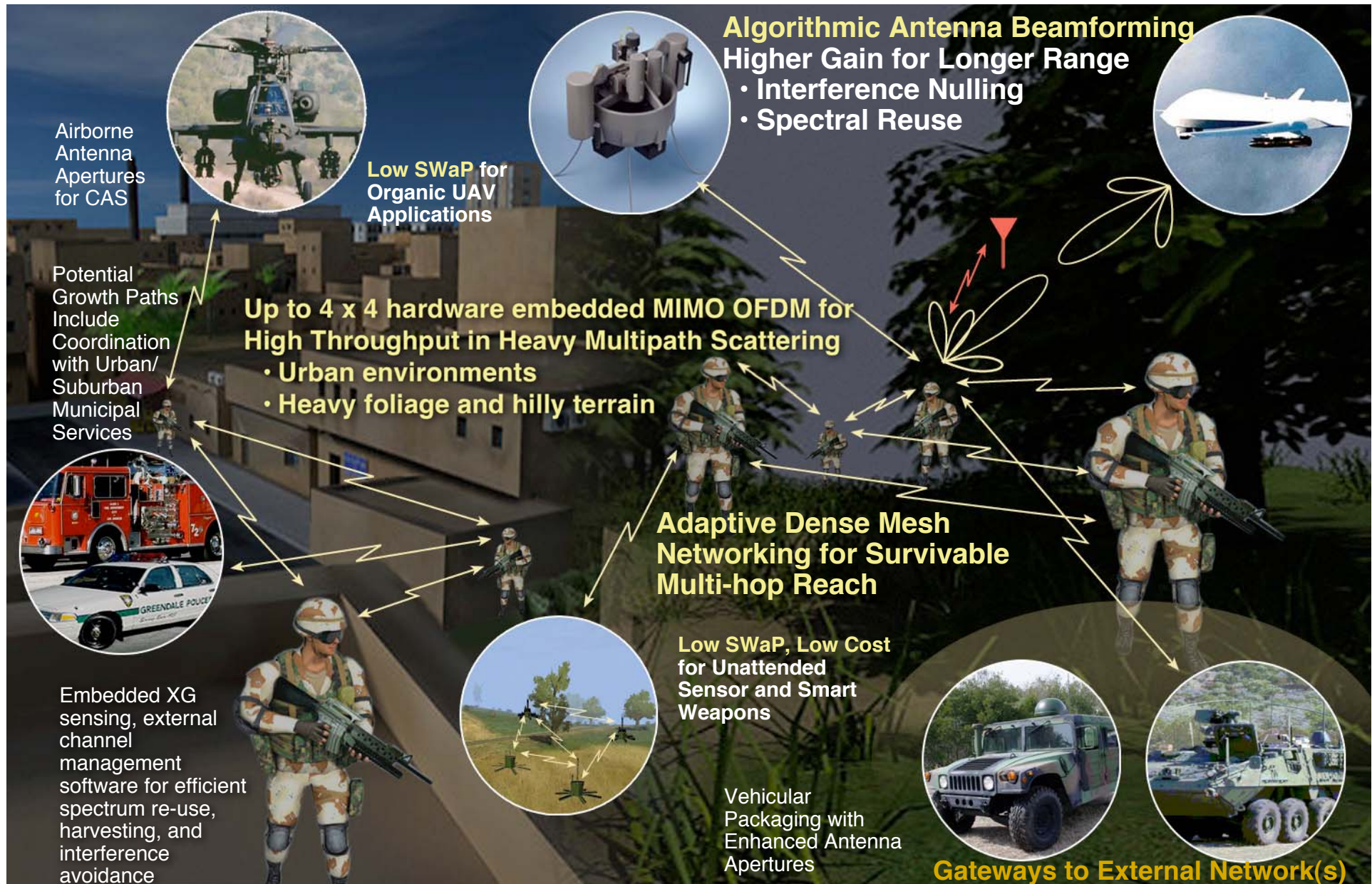
Honeywell Simplified Wireless Autonomous Node (SWAN)



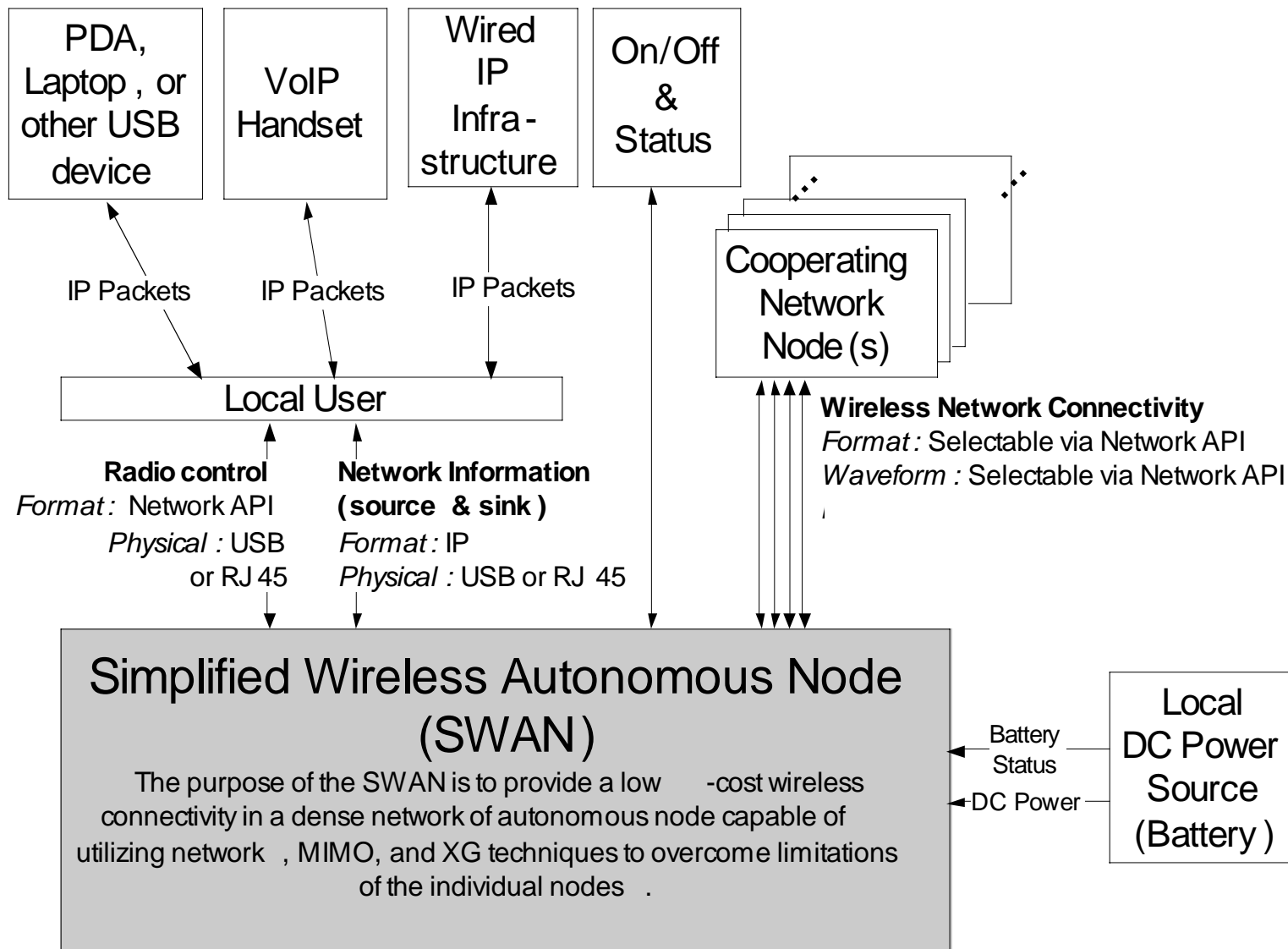
- An affordable MIMO-capable radio for highly reliable communication at high data rates in disadvantaged terrain.
- *A realistic and conservative \$500 cost estimate based on a solution region, not a point solution*
 - Honeywell CTTLF filters and MEMS switch technologies
 - Honeywell Radio-on-a-Chip technology developed on NASA AWINS program
 - Embedded hardware-based MIMO engine enables significantly higher MIMO data rates
 - A detailed and realistic assessment of commercial production quantities, rates, processes, financial structure, etc.
- 2000+ embedded MIMO and SISO modes provide extremely flexible network control options
- Independently configurable RF elements
 - Up to 4 x 4 MIMO, or,
 - 4 independent channels
 - RF element configuration controllable through API

SWAN brings low-cost mobile MIMO technology to a wide range of operational scenarios

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SWAN System Boundary Diagram

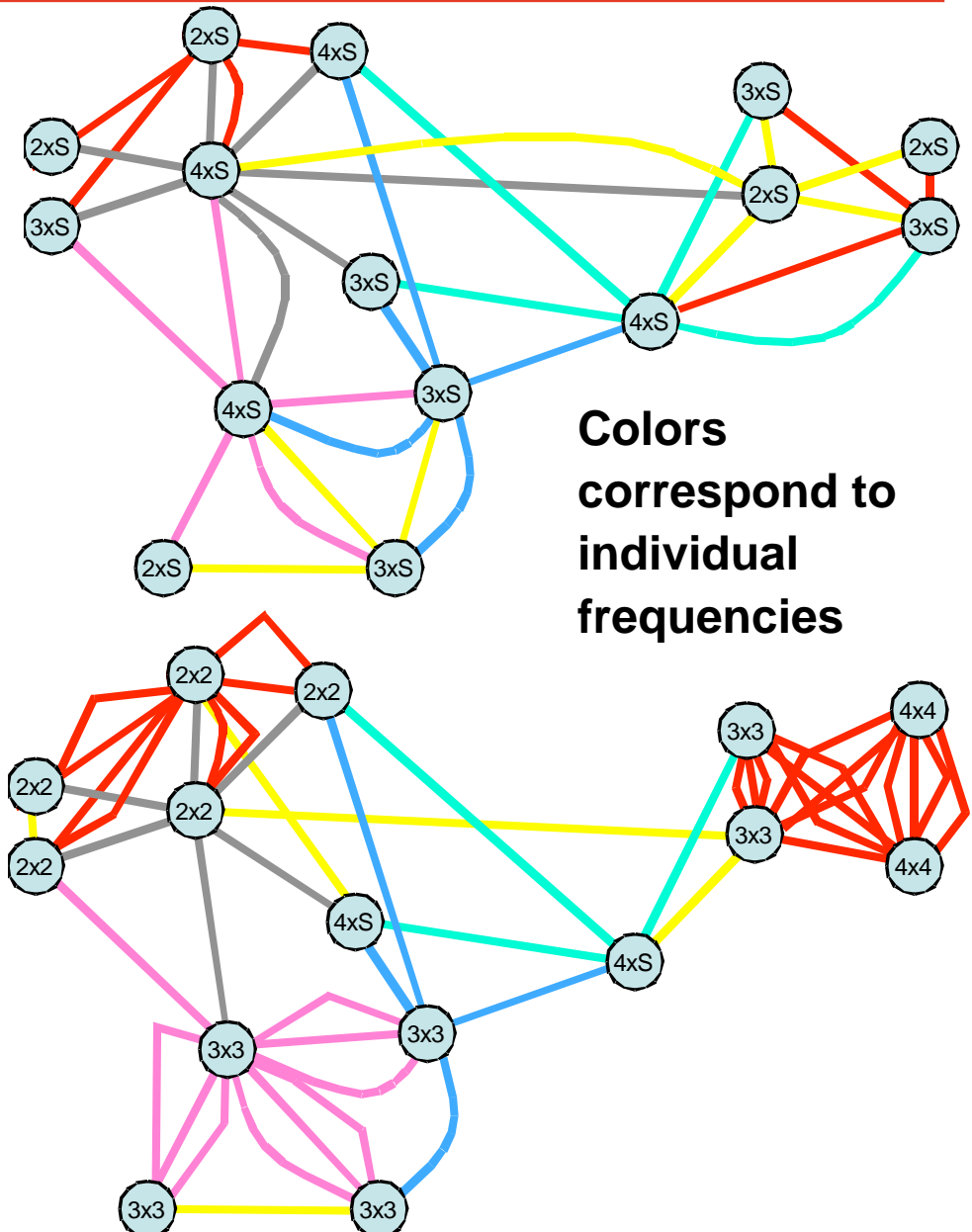


Rev 4: EFCL 5/19/2006 10:20 PM CDT
SWAN Diagramsrev 9BF.vsd

Network Configuration Support

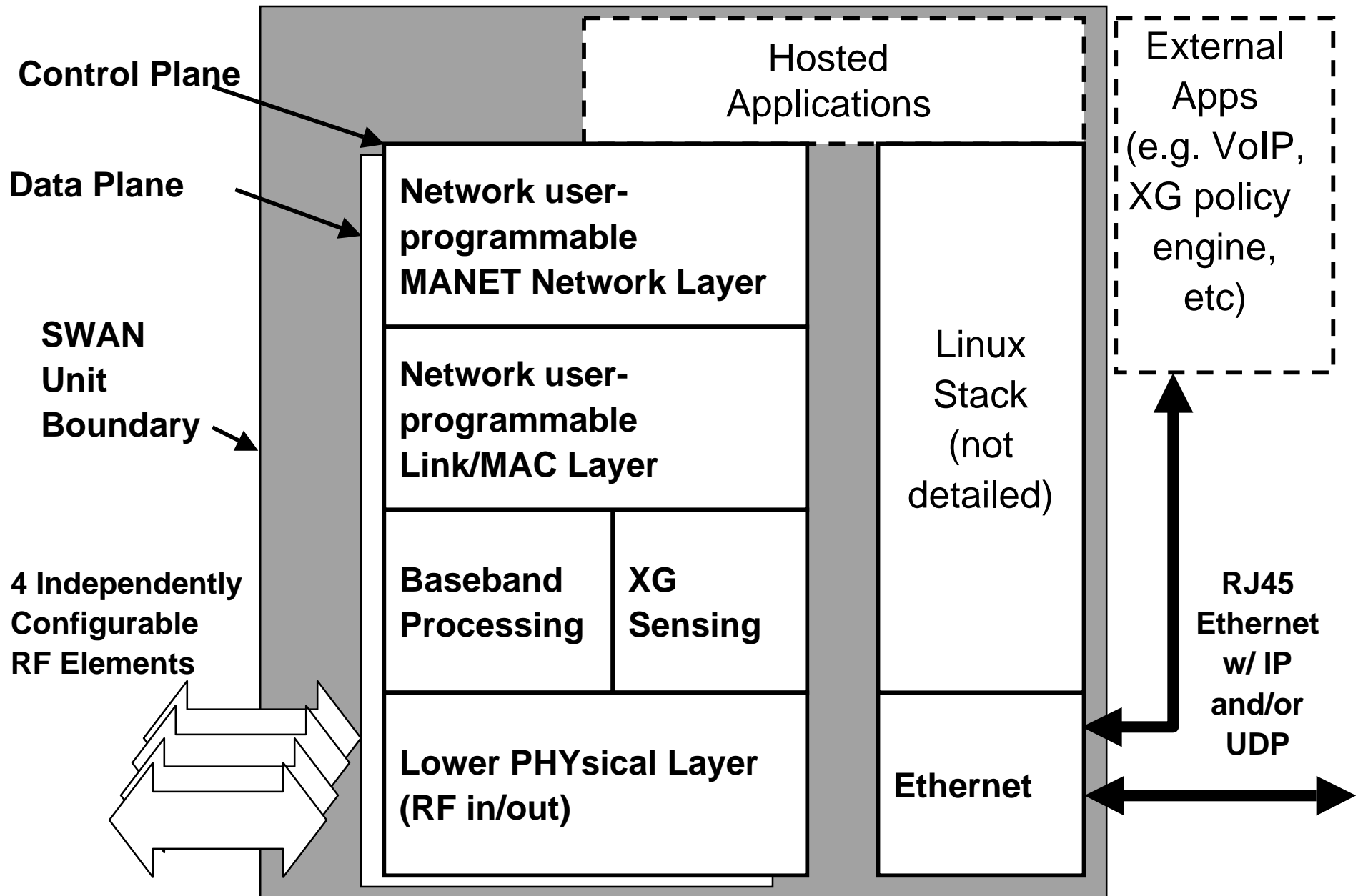
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- **SWAN Capabilities**
 - A MIMO-capable network node
 - *Tier 2.5* SDR
- **4 independent RF elements**
 - Antenna-to-information
 - Software reconfigurable with more than 2000 identified operating modes
- **Integrated MIMO capability**
 - N x M MIMO software configurable up to 4 x 4
 - Unique Silvus hardware accelerator provides up to 66 Mbps channel rate
- **Supports mixed modes**
 - Multi-channel single frequency
 - N x M MIMO
 - Space-Time Block Coding
 - Combination modes up to number of RF elements



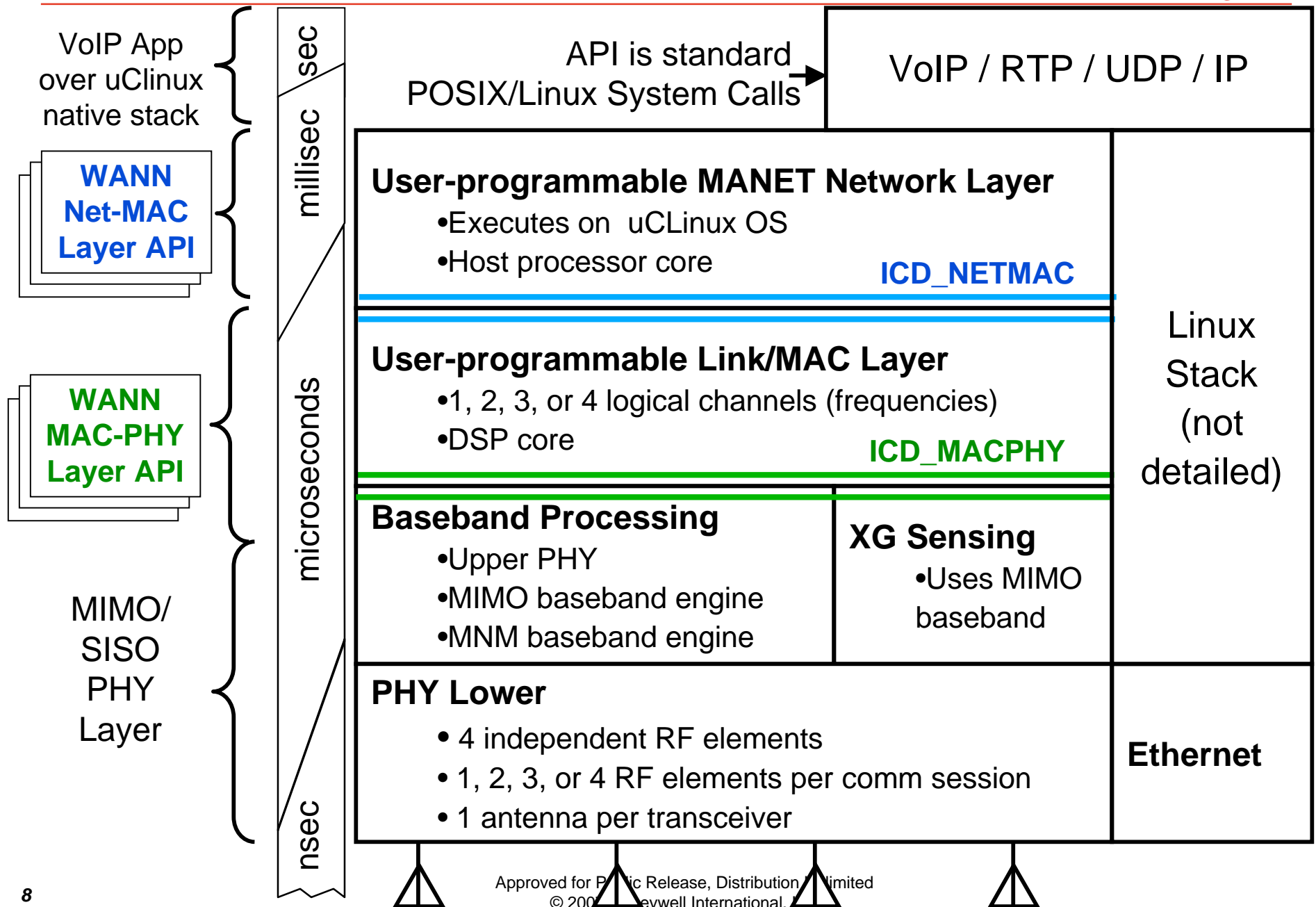
Data/Control Plane Abstraction

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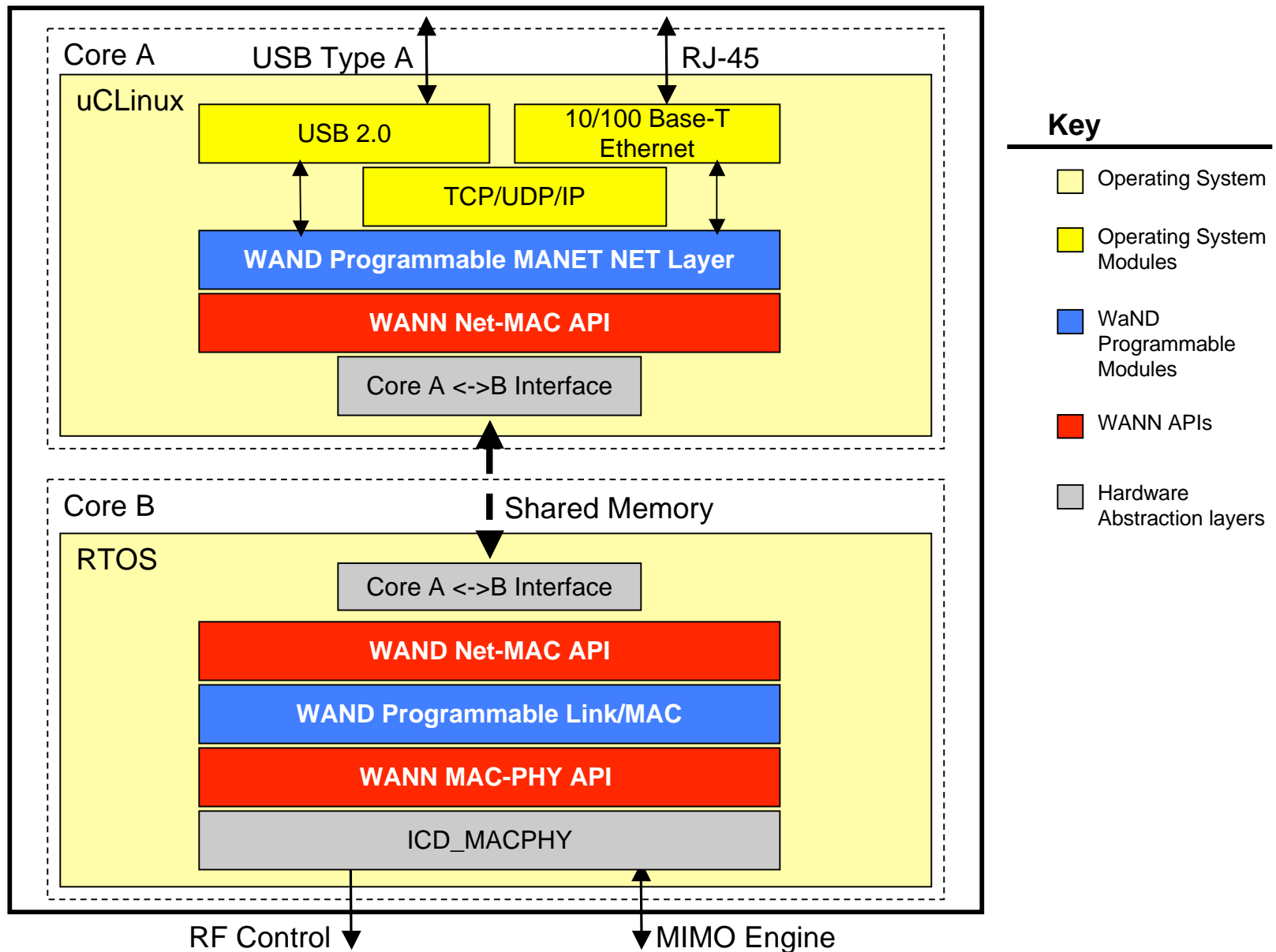
Preliminary Network API Relationships

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WANN Radio Software/Hardware Context

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Preliminary API Control Parameters

Rx & Tx mode set vectors: For each of the 4 RF elements

1. Center frequency (channel ID)
2. Bandwidth
3. Modulation
4. Coding
5. Rate
6. Power up/down/sleep
7. Independent Element or MIMO mode

**Updated parameter list,
plus detailed function
calls and syntax will be
discussed at API TIM**

Rx only status vector: For each of the 4 RF elements

1. Received power
2. Interference power
3. Noise power
4. Data ready (or generate interrupt to MAC?)
5. Channel state information
6. Time stamp of last received packet
7. Rx idling time (measured by monitoring energy)
8. Direction of arrival

Tx only mode set vector: For each of the communication session

1. Number of antennas & formed beam
2. Tx power

So why select SWAN as the WAND Radio?

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- **High probability of network developer success**
 - Our processing engine has already been implemented in FPGA...
 - ... therefore, our API maps into already proven hardware
- **Our two-level API structure details permits growth throughout WNaN and beyond**
- **Support for DARPA Wireless Networking Vision**
 - XG, DTN, MNM, Connectionless
- **Excellent radio performance in \$500 package**

Contact Information

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- **To learn more about the Honeywell SWAN approach, technology, architecture, and capabilities, contact one of the following**

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